

REMARKS

This paper is responsive to an *Official Action* that was issued in this case on October 15, 2008. In that *Action*, the Examiner withdrew the case from appeal, noting that applicant's arguments with respect to the rejection of claim 1-7, 9, and 11-15 were persuasive.

The Examiner, however, maintains the pending rejections of claims 8 and 10. Furthermore, the Examiner issued new rejections under 35 USC §§102, 103 as to claims 1-7, 9, and 11-15.

In response to the *Action*, applicant has amended claim 1, 3-5, 8, and 12 to improve clarity and distinctness. Furthermore, claims 7 and 14 have been canceled and new claims 16 and 17 have been added. Reconsideration is requested in view of the foregoing amendment and the following comments.

IR-Transmitting Optical Fibers

An issue has arisen regarding the ability of conventional optical fibers to transmit IR and the use of IR-transmitting optical fibers in conjunction with the present invention. Specifically, the Examiner cited an article that allegedly shows that "standard optical fibers are capable of transmitting in that region [IR] of the electromagnetic spectrum." The Examiner concluded, therefore, that "the alleged claim that a 'standard' optical fiber is not capable of transmitting within this range is improper."

Applicant never stated that a standard optical fiber is incapable of transmitting within the infrared range. Rather, the applicant stated that a standard optical fiber was not suitable for use in conjunction with the present invention (and that is true):

To the extent that some small amount of infrared radiation could be propagated through a standard optical fiber, such a fiber is not suitable for use in conjunction with applicant's invention. (See Appeal Brief, p 12.)

In the specification, at paragraphs [0016]-[0017], applicant explicitly stated that "apparatus **100** includes a plurality of infrared-radiation ("IR")-transmitting fibers **102**, sensor(s) **108**, and sliding separator **110**." The applicant then identified suitable IR-transmitting fibers, such as "chalcogenide glass, polycrystalline IR ("PIR") fibers, and heavy metal fluoride glass ("HMFG")" that are "suitable for use in conjunction with the illustrative embodiment of the present invention."

Notwithstanding the article cited by the Examiner, in a scenario (research, development, product, *etc.*) in which the transmission of IR is an important aspect or consideration, one skilled in the art would use a fiber that is specifically intended for IR transmission. And such a fiber would not be a conventional fiber.

Furthermore, and more to the point, for the protein binding interactions being monitored in conjunction with applicant's invention, the emission wavelength of the IR is typically in the range of about 3 to 12 microns. No conventional optical fiber would be (or could practically be) used to transmit EM in that range. Thus, it is correct, as stated in applicant's Appeal Brief, that "a standard optical fiber ... is not suitable for use in conjunction with applicant's invention." Rather, a suitable fiber is a "IR-transmitting fiber," such as chalcogenide glass, polycrystalline IR ("PIR") fibers, and heavy metal fluoride glass ("HMFG").

Applicant's specification is the most appropriate source of information for interpreting the claim language. In the context of appellant's disclosure, it is not reasonable to interpret the phrase "IR-transmitting fiber" as including a conventional optical fiber, regardless of whether or not it can poorly transmit some select wavelengths of in the near-IR range.

Rejections Under 35 USC §102

A. Rejections over U.S. Pat. No. 6,157,442 to Raskas

The Examiner rejected claims 8 and 10 as being anticipated by U.S. Pat. No. 6,157,442 to Raskas. Claim 8 recites a method comprising:

physically engaging a chemical entity to a first end of an IR-transmitting fiber;
bringing said chemical entity in contact with a binding compound; and
conducting a thermal signal resulting from a binding interaction to a thermal sensor through said IR-transmitting fiber, wherein said binding interaction occurs between said chemical entity and said binding compound.

Raskas discloses a device that measures a concentration of a liquid sample. Raskas' device comprises a light source (30), an optical fiber (34), a tip device (38), a detector (42), and a computer (44). (See FIG. 2.) The tip (38) is treated with a chemical coating (*e.g.*, a dye, *etc.*) that is intended to interact with the sample of interest. (Col. 4, line 57 – Col. 5, line 17.)

In operation, the tip (38) is placed in the liquid sample. The chemical coating and the sample react, and the color of the coating changes. Meanwhile, the light source (30)

generates a beam of light that is transmitted via fiber (34) to the tip (38). The color of that light beam changes due to the change in color of the coating. With reference to FIG. 2, the color of incoming light beam (36) will therefore be different than outgoing light beam (40). That difference in color is quantified by the detector (42). Once quantified, the signal is provided to the computer (44), which determines the concentration of the chemical being sensed. (See, Col. 5, lines 18-37.)

Among any other distinctions, Raskas does not disclose an IR-transmitting fiber, a thermal signal, or a thermal sensor. In fact, Raskas does not practice any of the method steps recited in claim 8.

With regard to the first point, Raskas does not disclose the use of an IR-transmitting optical fiber. As previously noted, to the extent that some small amount of infrared radiation could be propagated through a standard optical fiber, such a fiber is not suitable for use in conjunction with applicant's invention. In the context of appellant's disclosure, it is not *reasonable* to interpret the phrase "IR-transmitting optical fiber" to include the conventional optical fiber used by Raskas. Applicant's disclosure makes clear that ordinary optical fiber is not acceptable for use in the conjunction with the claimed invention, explicitly disclosing the use of chalcogenide glass, polycrystalline IR ("PIR") fibers, and heavy metal fluoride glass ("HMFG").

Raskas makes no mention of IR-transmitting fiber, and, indeed, would have no use for such speciality fiber. As a consequence, Raskas does NOT disclose the step of "physically engaging a chemical entity to a first end of an IR-transmitting optical fiber."

Raskas is not monitoring thermal events; rather, Raskas is monitoring color change. The signal that Raskas transmits is not a "thermal signal," (*i.e.*, not electromagnetic energy in the infrared range). Rather, Raskas transmits an optical signal, the frequency of which is in the visible range, since "colors" are being distinguished by the sensor. Since Raskas is not concerned with IR-generating events, he does not use a thermal sensor for monitoring. Raskas does not, therefore, disclose the step of "conducting a thermal signal resulting from a binding interaction to a thermal sensor through said IR-transmitting fiber."

The Examiner states that "the change in wavelength [of Raskas] defines a thermal signal." Applicant does not understand the basis for this statement. Applicant would appreciate some explanation from the Examiner on this point.

For these reasons, it is believed that claim 8 is not anticipated by Raskas. Since claim 10 is

dependent on claim 8, it is allowable to the extent that claim 8 is allowable.

B. Rejections under U.S. Pat. No. 6,519,032 to Kuebler et al.

The Examiner rejected claims 1, 3-10, and 12-15 as being anticipated by U.S. Pat. No. 6,519,032 to Kuebler *et al.*

Amended claim 1 recites:

a plurality of IR-transmitting optical fibers, wherein said optical fibers each have a first end and a second end, and wherein said fibers are capable of transmitting infrared radiation ("IR") generated during decoding of a protein via a binding interaction of the protein with a binding compound;

a sensor for sensing the IR generated via the binding interaction, wherein said sensor is in IR-sensing contact with said first end of each of said optical fibers; and

a sliding separator, wherein said separator engages said plurality of fibers and is slideable therealong to alter a separation therebetween, wherein the alterable separation facilitates the engagement of the optical fibers with individual samples disposed in wells of any one of a variety of different-sized sample plates having different spacing between the wells.

Keubler discloses methods and systems for rapid characterization and screening of liquid samples to determine properties (*e.g.*, particle size, particle size distribution, molar mass, and/or molar mass distribution) with static or dynamic light scattering.

Keubler does not disclose what is recited in claim 1. In particular, and among other distinctions, Keubler does not disclose IR-transmitting optical fibers that are capable of transmitting IR generated during decoding of a protein via a binding interaction of the protein with a binding compound. As previously noted, the IR given off from the relevant types of binding interactions is in the range of 3 to 12 microns.

Keubler does not disclose a sensor that is capable of sensing IR generated from a binding interaction of a protein with a binding compound. Keubler discloses the use of avalanche photo diodes (FIG. 2, item 450). APDs are not used for thermal sensing (bolometers are used) and they are not active in the IR range of interest (mid to far IR).

Keubler notes that optical techniques other than light-scattering, such as optical spectroscopy, can be used with the invention. No disclosure is provided, however, as to

how such characterization methods could be used in conjunction with the system as disclosed.

Keubler does not disclose a sliding separator wherein said separator engages a plurality of fibers and is slideable therealong to alter a separation between the fibers. The Examiner alleges that probe head (2500) reads on applicant's claimed separator. As depicted in FIG. 3B and as disclosed in Keubler, probes (420) depend from the probe head and can be laterally positioned as appropriate for the sample plate. That, however, is quite distinct from the operation of applicant's sliding separator, as disclosed and claimed. Specifically, in Keubler, the probe head does not "engage" optical fibers nor does it slide along such fibers to alter the spacing between the fibers.

Since Keubler does not disclose what is recited in claim 1, that claim is not anticipated thereby. Since claims 3-6 are dependent on claim 1, they are likewise allowable.

Amended claim 8 recites:

physically engaging a chemical entity to a first end of an IR-transmitting fiber;
bringing said chemical entity in contact with a binding compound; and
conducting a thermal signal resulting from a binding interaction to a thermal sensor through said IR-transmitting fiber, wherein said binding interaction occurs between said chemical entity and said binding compound.

Keubler does not disclose the operation of "bringing said chemical entity in contact with a binding compound." The Examiner cites to col. 6, lines 43-50 in support of his allegation that Keubler discloses the claimed operation. That language provides no such disclosure. The Examiner also notes that polymerization and catalyst synthesis requires bringing a binding compound in contact with a chemical entity. Regardless of whether or not this statement is correct, it's irrelevant. That is, Keubler's system and method is not used to conduct polymerization or catalyst synthesis. Rather, it is used to characterize the *results* of polymerization reactions, etc.:

It is therefore an object of the present invention to provide systems and protocols for characterizing combinatorial libraries of polymer samples and non-polymer samples, and particularly, libraries of or derived from synthesis reactions such polymerization product mixtures, or libraries of or derived from formulations....

(Col. 3, lines 53+.)

And the characterizing method, which is the subject of Keubler's patent, does NOT bring a chemical entity in contact with a binding compound. And, since there is no binding interaction occurring, there is no thermal signal resulting therefrom. As such, Keubler does not disclose the operation of "conducting a thermal signal resulting from a binding interaction...."

For these reasons, among any others, claim 8 is not anticipated by Keubler. Since claims 9-10 are dependent on claim 8, they are likewise allowable.

Amended claim 12 recites:

positioning a movable separator along a plurality of IR-transmitting optical fibers to obtain a desired spacing between adjacent IR-transmitting optical fibers at a sampling end thereof;
generating a thermal signal from a binding interaction between a protein and a binding compound, wherein the thermal signal is generated proximal to the sampling end of at least one of the IR-transmitting optical fibers; and
conducting the thermal signal through at least one of said IR-transmitting optical fibers.

As previously discussed, Keubler does not disclose positioning a movable separator along a plurality of IR-transmitting optical fibers to obtain a desired spacing between the fibers. Furthermore, Keubler does not disclose generating a thermal signal from a binding interaction between a protein and a binding compound. Nor does Keubler disclose conducting a thermal signal through at least one of the IR-transmitting fibers.

Therefore, claim 12 is not anticipated by Keubler. Since claims 13-15 are dependent on claim 12, they are likewise allowable.

Rejections Under 35 USC §103

The Examiner rejected claims 2 and 11 as being obvious over Kuebler. The Examiner alleges that Keubler discloses the apparatus of claim 1 except for bundling the optical fibers. But according to the Examiner, Keubler discloses that up to 1920 optical fibers can be used in conjunction with the invention. The Examiner suggests that it would have been "clearly obvious ... to made use of collar or other means to keep all of these optical fibers together to prevent the optical fibers from breaking, kinking, or other random movements..."

First, as previously discussed, Kuebler does not disclose the elements of claim 1. As to citation referenced be Examiner, it is disclosed that up to 96 x 20 light-scattering probes

can be used. Referring to FIGs. 3A or 3B, it is readily apparent that the fiber that receives the scattered light is disposed *within* probe (420). And since the receiving fiber is completely enclosed by the housing of the probe, why would there be any propensity for the fiber to break, whether there were one probe or 1920 probes? Furthermore, even if one wanted to use a collar to bind those 1920 fibers, how could that be done – they're enclosed? Clearly, one skilled in the art would not use a collar in conjunction with the Kuebler system.

As a consequence, claim 2 is not obvious over Kuebler.

The Examiner alleges that claim 11 is obvious over Kuebler. In particular, the Examiner alleges that Kuebler discloses all operations of claim 8 except where bringing a chemical entity into contact with a binding compound further comprises inserting the first end of the IR-transmitting fiber into a well after engaging the chemical entity.

The Examiner alleges, however, that Kuebler discloses bringing a chemical entity in contact with a binding compounding (where polymerization and catalysis reactions are performed). Therefore, according to the Examiner, it would be obvious to modify the disclosed method and insert the fiber into the well after engaging the chemical entity.

As previously discussed, Kuebler does not disclose (or suggest) all operations recited in claim 8. Therefore, claim 11, which is dependent on claim 8, is allowable.

New Claims 16 and 17 are Allowable

The cited art does not disclose or suggest a number of the limitations of claims 16 and 17. These claims are therefore allowable over the art of record.

Conclusion

It is believed that claims 1-6, 8-13, and 15-17 now presented for examination are in condition for allowance. A notice to that effect is solicited.

Respectfully,
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